ABSTRACT OF THE DISCLOSURE

The present invention is directed to a system and a method for analyzing and identifying an unknown sample using ion mobility spectrometry. The method pulses an ion gate using a temporally spaced pattern of ion admitting periods and ion repelling periods to achieve an admission duty cycle of about 50% of the total scan time. Ions passing through the drift tube strike an ion detector, generating a time dependent mobility spectrum. A combination of wavelet decomposition and statistical evaluators are used on the mobility spectrum to produce a distinct signature associated with the sample. Signatures are also generated for a number of known agents, and the known agent signatures are used to program a neural network. The sample signature is then compared to the signatures for the known agents using a fuzzy decision maker.